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(54) **Flock transfer**

(57) A flock transfer comprises flock (12) temporarily adhered to a base sheet (10), the flock having a pattern or design (13) applied thereto in the form of an adhesive/barrier layer (16/15) the barrier layer including an expandable material (15) which will expand on heating to a predetermined temperature. During flock transfer printing the flock transfer and a substrate are heated to adhere the flock to the substrate and to expand the expandable material, thus producing a raised design which simulates conventional embroidery.

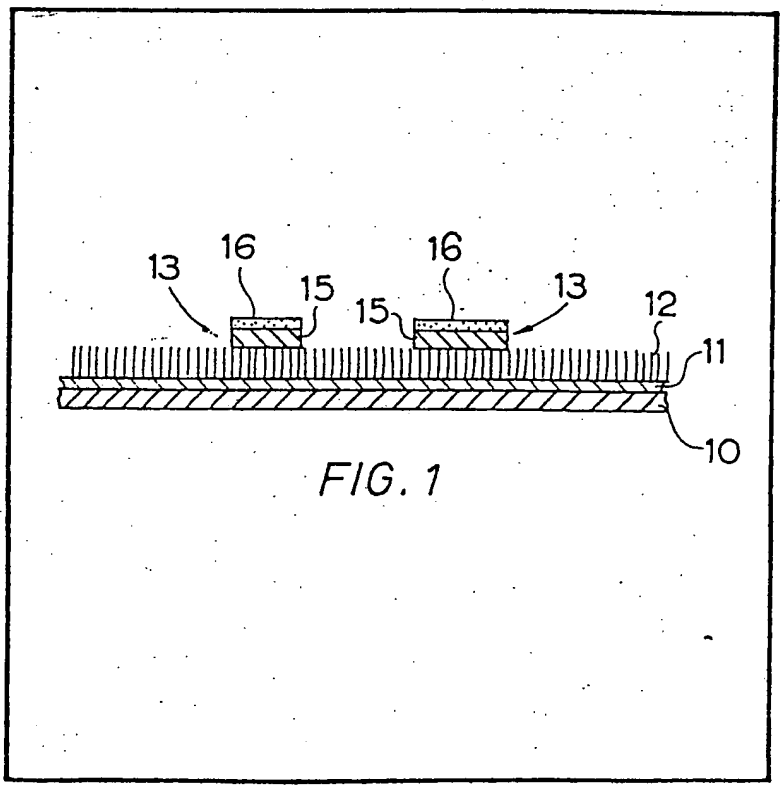

FIG. 1

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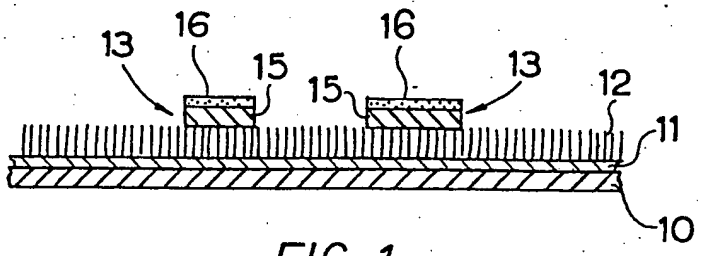

FIG. 1

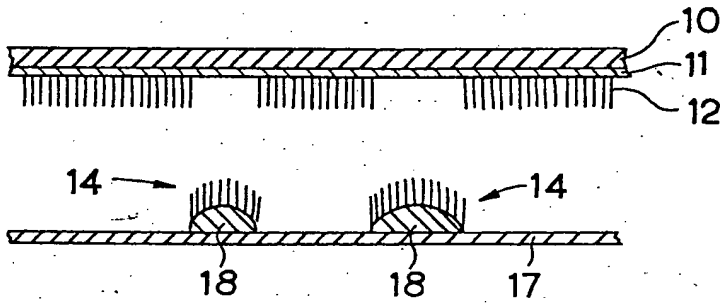

FIG. 2

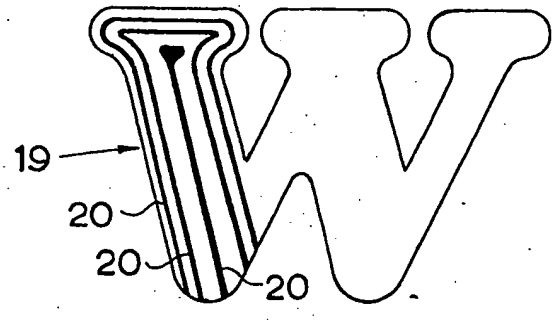

FIG. 3

SPECIFICATION
Flock transfer

This invention relates to flock transfer and more particularly concerns transfer flock printing.

Transfer flock printing is widely known. The process involves the use of a flocked base sheet, on to which the flock is temporarily attached. A design or pattern is printed on to the flocked surface, and while this is still wet, adhesive powder is sprinkled over the whole surface of the flocked base sheet. When the printed adhesive has dried, or has been partially cured, the surplus powder is removed by vacuum or vibration, and only the powder over the adhesive printed areas remains in position. The printed adhesive areas become inert or relatively inert, and are known as a barrier layer.

It is also possible to print onto the flock surface a one stage adhesive, which does not require an additional layer of adhesive powder.

The design or pattern can be printed by any conventional printing technique, screen printing being a preferred technique.

In order to apply the design or pattern to a substrate, such as a garment, the flock transfer, produced as described above, is superposed on the substrate and heated under pressure. This causes the hot-melt adhesive to adhere to the substrate and when the base sheet is removed the flock remains secured to the garment only in the areas in which it is printed.

It is also known to produce relief-coating on a substrate by applying an ink incorporating a foamable material. Such a process is employed as an alternative to flock printing to produce patterns or designs on a substrate. Such materials are available under the trade names MINERFOAM, EXPANDEX, AQUA-SPUN, SPECTER-PUFF, UNIPUFF etc.

It is an object of the present invention to provide an improved flock transfer and flock transfer process, which has the appearance, texture and handle of conventional embroidery.

According to one aspect of the present invention we provide a flock transfer which comprises flock temporarily adhered to a base sheet, the flock having a pattern or design applied thereto in the form of an adhesive/barrier layer, said barrier layer including an expandable material which will expand on heating to at least a predetermined temperature.

The adhesive/barrier layer may be applied as a single layer or may be applied as separate barrier and adhesive layers.

The predetermined temperature is usually in the range 110°—180° preferably 130°—170°.

The flock transfer defined above can be applied to a substrate such as a garment to transfer flock to the substrate in a conventional process as defined above. The use of an expandable material in the barrier layer which will expand on heating during the flock transfer process will provide a three-dimensional flock pattern or design on the substrate.

Materials suitable for use as the barrier layer include any of the materials which are used in conventional transfer flock printing. These are preferably in the form of a thixotropic paste when the pattern or design is to be applied by screen-printing.

Specific materials useful for the barrier layer are acrylic polymers and elastomers including polyurethanes, or natural or synthetic rubbers, which may be in the form of an emulsion in water, and polyvinyl chloride which may be in the form of a plastisol.

The hot-melt adhesive may also be any adhesive used in conventional transfer flock printing such as hot-melt adhesive powders based on a polyamide or polyester.

The expandable material which is included in the barrier layer may be a polystyrene foam or foam precurser and may be incorporated in a binder. The binder may be an acrylic material. When an expandable material comprising a foam or foam precurser in a binder is employed we have found that a preparation of 50:50 ratio by weight of barrier material to expandable material is satisfactory but generally this ratio can be between 40:60 and 90:10. In fact the proportion can be adjusted to the degree of dimensional expansion desired. The amount of expandable material used will depend upon the three-dimensional effect required.

The patterns or designs may be of any desired form, such as motifs, logos, emblems etc., or may be in the form of written matter, words, numbers or individual letters.

According to another aspect of the invention, a barrier layer incorporating an expandable material may be applied to the entire flocked surface of a flocked base sheet and patterns or designs could then be cut, e.g. by die-cutting from the material. Such patterns or designs can then be applied by hot pressing onto a substrate such as a garment. The patterns or designs may be in the form of decorative logos or emblems and/or words or may comprise individual letters which can be assembled on a garment as required.

It is possible to add colouring matter to the barrier paste which contains expandable material, which is different from the colour of the flock. By this means a two-tone effect can be achieved in which the final pattern and texture more closely resembles the texture and feel of embroidery. This effect is caused by a proportion of the bubbles, which have formed by application of heat and pressure to escape towards and through the flock surface, thus giving an appearance of textured yarn or embroidery stitches.

A further form of the invention involves pre-printing the flock in different colours in predetermined areas prior to the application of barrier layer incorporating the expandable material. By this means when the pattern or design is transferred to a garment discrete areas of the pattern design would be transferred in different colours thereby producing a multi-coloured pattern or design.

The invention also comprises a method of producing a flock transfer for applying a pattern or design to a substrate, such as a garment which method comprises printing a flock carried by a base sheet with a barrier layer incorporating an expandable material in discrete areas to define a pattern or design, applying an adhesive to the barrier layer.

According to yet another aspect of the invention a process of flock transfer printing comprises assembling a flock transfer as defined above with a substrate, heating the assembly under pressure and stripping the base sheet from the substrate thereby leaving flock in the form of a pattern or design on the garment.

In order that the base sheet can be stripped from the substrate leaving the flock pattern or design applied to the substrate, the flock may be lightly bonded to the base sheet or may be bonded by means of a soluble adhesive.

Reference is now made to the accompanying drawings, in which:—

Figure 1 is a schematic illustration of a flock transfer according to the invention;

Figure 2 is a schematic illustration of a process of flock printing according to the invention; and

Figure 3 is a schematic illustration of one way of producing patterns or designs to more closely simulate embroidery.

Referring to Figure 1 a flock transfer comprises a base sheet 10 having a layer of adhesive 11 applied thereto to bond temporarily a layer of flock 12 to the base sheet 10. A pattern or design is printed in discrete areas on the flock 12, for example by screen printing, these areas being identified by the reference numeral 13. The areas 13 are printed with a barrier layer of thermoplastic material 15 incorporating a heat-expandable material and before the barrier material is dry it is sprinkled with a hot-melt adhesive powder 16.

The process of transferring the pattern or design to a substrate 17 is illustrated in Figure 2. The flock transfer is placed in contact with the substrate 17 and heated under pressure. The base sheet 10 is then stripped from the substrate 17 to give the situation illustrated in Figure 2 in which the flock has been transferred to the substrate 17 in the areas designated 14 in Figure 1.

The transferred areas are designated 14 in Figure 2 and the expansion of the expandable material during the heating step causes the barrier layer 15 to take-up a convex shape 18 as illustrated in the drawing thereby providing a three-dimensional effect to the pattern or design.

We have found that the most effective simulation of the embroidery occurs when relatively thin lines are used, generally lines of a width of 1 to 5 mm being preferred. With such thin lines, the bubbles which form under heat and pressure, break through in a certain pattern, which in turn give the impression of embroidery stitches.

If it is desired to form wider designs (i.e. covering a wider area), a series of thinner lines adjacent to each other can be used: thereby imitating rows of stitches. An example of this is shown in Figure 3 in which a pattern 19 is made up from the number of spaced thin lines 20.

Claims

1. A flock transfer which comprises flock temporarily adhered to a base sheet, the flock having a pattern or design applied thereto in the form of an adhesive/barrier layer, said barrier layer including an expandable material which will expand on heating to at least a predetermined temperature.

2. A flock transfer according to Claim 1 in which the adhesive/barrier layer is applied as a single layer.

3. A flock transfer according to Claim 1 in which the adhesive and barrier layers are applied as separate layers.

4. A flock transfer according to any of Claims 1 to 3 in which the barrier layer is applied in the form of a thixotropic paste.

5. A flock transfer according to any of Claims 1 to 4 in which the barrier layer is an acrylic polymer or an elastomer.

6. A flock transfer according to Claim 5 in which the elastomer is a polyurethane or a natural or synthetic rubber.

7. A flock transfer according to Claims 5 or 6 in which the elastomer is in the form of an emulsion.

8. A flock transfer according to any of Claims 1 to 4 in which the barrier layer is a polyvinyl chloride in the form of a plastisol.

9. A flock transfer substantially as herein described with reference to the accompanying drawings.

10. A method of producing a flocked pattern or design which comprises applying a barrier layer incorporating an expandable material to the flocked surface of a flocked base sheet and then cutting patterns or designs from the surface.

11. A method according to Claim 10 in which colouring is added to the barrier layer, said colouring being different from the colour of the flock.

12. A method of producing a pattern or design which comprises preprinting a flocked surface of a flocked base sheet in different colours in predetermined areas and subsequently applying thereto a barrier layer incorporating an expandable material.

13. A method according to Claim 12 in which the printing is carried out in discrete areas to define a desired pattern or design.

14. A method of flock transfer printing which comprises assembling a flock transfer as defined in any of Claims 1 to 9 with a substrate, heating the assembly thereby adhering the flock in a desired pattern or design on the substrate, the heating being sufficient to raise the temperature of the expandable material to at least the predetermined temperature so that the expandable material is expanded.

15. A method according to Claim 13 in which the flock is lightly bonded to the base sheet.

16. A method according to Claim 15 in which the flock is bonded to the base sheet by means of a soluble adhesive.

17. A method of flock transfer printing substantially as herein described with reference to the accompanying drawings.

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